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# United States Department of Agriculture, FOREST SERVICE.

GIFFORD PINCHOT, Forester.

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## SILVICAL LEAFLET 49.

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### SHAGBARK HICKORY.

*Hicoria ovata* (Mill) Britton.

Shagbark hickory is the most widely distributed of all the hickories, the most extensively cut, and, because of its characteristic bark and the value of its nuts, the best known. Hickory is unrivaled for vehicle construction and for the handles of axes and other implements. The heavy demand for hickory wood, combined with the rapidly decreasing supply, gives it great importance from the standpoint of forest management.

#### RANGE AND OCCURRENCE.

The range of shagbark is from southern Maine westward through Montreal, where it reaches latitude  $45^{\circ} 40'$ , Lake St. Clair and southeastern Minnesota to extreme eastern Nebraska, and south to the Gulf of Mexico at Matagorda, Tex., and the Appalachicola River in Florida. Its western limit is in the river bottom of Texas at about longitude  $98^{\circ}$ . It is not found in eastern Florida, nor in the coastal plain in the South Atlantic States, but in the New England States and as far south as Delaware it extends east to the Atlantic coast. The region of its greatest commercial importance lies west of the Appalachian Mountains, south of Massachusetts, New York, southern Michigan, and central Illinois and Missouri, and east of Oklahoma and Texas.

#### CLIMATE.

Shagbark is one of the hardiest of the hickories. In the northern part of its range, in southern Wisconsin, it will thrive with a growing season of about 5 months, an average summer temperature of  $71^{\circ}$  F., an average minimum of  $7^{\circ}$  during the coldest month, and an extreme minimum of  $-43^{\circ}$ , although under such conditions its growth is comparatively slow. At its southern limit the growing season is more than 9 months long, and the average summer temperature is about  $82^{\circ}$  F. It seems to require an average precipitation of 30 inches and reaches its best development in the Cumberland Mountains, with an average annual precipitation of 50 or 60 inches. Here there is an average summer temperature of about  $70^{\circ}$  F., about  $5\frac{1}{2}$  months free from frost, and severe winters, when the temperature sometimes falls to  $20^{\circ}$  or  $30^{\circ}$  below zero.

## ASSOCIATED SPECIES.

Shagbark never grows naturally in large pure stands, though groups covering a quarter of an acre are sometimes found on bottomlands. It is usually scattered rather unevenly through stands of other trees. In the northeast it occurs very sparingly in mixture with white ash, red and sugar maple, basswood, and white oak. In the Ohio Valley States its common associates on bottomlands are big shellbark or king nut (*Hicoria laciniosa*), white oak, white ash, pin oak, and sycamore, while on better-drained situations maple, beech, basswood, walnut, bitternut (*Hicoria minima*), chestnut, and red oak creep in. The typical north slope forest of the Cumberlands consists of hard maple, white oak, yellow poplar, basswood, pignut or black hickory (*Hicoria glabra*), and shagbark. In the typical bottomland of the South the most common associates of shagbark are cow oak, pin oak, shingle oak, sweet gum, ashes, black gum, big shellbark, and pecan.

## HABIT.

The bark of shagbark is its most distinctive feature. On small trees it is very smooth and grayish. As the tree increases in age the bark breaks up, first into small flakes or strips and finally into very long strips, which are attached to the tree only at the upper portion of their length, and, hanging loose, give the trunk its characteristic "shaggy" appearance. Only the big shellbark imitates this shagginess to any great extent, and even this is more likely to have a firm-ridged bark.

The twigs and foliage of shagbark are rather coarse, but less so than those of big shellbark. The leaves are compound, and the broad leaflets are five, or rarely seven, in number. The terminal winter buds are rather full, sharply pointed, and covered with smooth dark-brown scales. They are usually less than one-half inch long, larger than the buds of pignut, but smaller than those of big shellbark. The nuts have a thick husk which falls off readily when dry; their shells vary greatly in thickness and are sometimes so thin that they may be cracked with the teeth; the kernel is sweet.

Shagbark attains a large size in the virgin forest, and heights of 130 or 140 feet with diameters of 20 or 30 inches are not uncommon in the Cumberland Mountains. On the southern river bottoms a greater diameter and less height are characteristic. Shagbark is more likely to fork than other hickories. The bole of an old tree is usually clear of branches for from one-half to two-thirds of the height, and the crown consists of a few short, heavy, spreading limbs. Young trees, however, frequently retain their branches and form long cylindrical crowns. The tree produces a deep, strong taproot except when it grows in wet soils, when both taproot and laterals are much curtailed.

The wood is heavy, hard, strong, and tough. It is exceeded in toughness and strength only by pignut. The heartwood is dark reddish-



brown in color and the sapwood, which is narrower than in mockernut (*Hicoria alba*) or pignut, is creamy white. The wood splits readily and is very liable to windshake.

#### SOIL AND MOISTURE.

It is primarily a tree of fresh, fertile soils. As a rule it grows on moister soils than pignut and mockernut and in slightly drier situations than big shellbark. While in the North it grows chiefly on fresh and often fairly dry soil, in the South it is confined to moist river bottoms where water often stands during several months in the year, and throughout its range it is frequently found in moist, rich situations along streams. In the Cumberland Mountains, where shagbark reaches its greatest height, it grows in coves and on rich north and east slopes. The wood grown in clay soil is ordinarily considered better than that produced in sandy soil.

#### TOLERANCE.

Next to pignut, shagbark is the most shade-tolerant of the hickories. Among its common associates in the North, it is exceeded in this respect only by pignut, sugar maple, and beech. In the South black gum in many cases seems more tolerant. This ability to endure shade is probably due largely to its habit of forming a strong, deep taproot at an early age.

#### GROWTH AND LONGEVITY.

The growth of shagbark is about the same as that of pignut. Under favorable conditions a seedling will grow 3 inches in height each year for the first 5 years. After that the growth will average 1 foot a year for about 60 years, when it begins to fall off. In diameter the average increase is 1 inch in 7 years. The growth is extremely persistent, but somewhat less so than that of pignut.

The age of mature shagbarks in the virgin forest is from 225 to 250 years. Trees over 300 years old are very seldom found.

#### REPRODUCTION.

Shagbark is a fairly prolific seed bearer. Full-grown, thrifty trees, in the open, often produce crops of  $1\frac{1}{2}$  or 2 bushels of nuts at intervals of 2 or 3 years, a quantity about equal to that produced by the big shellbark. The nuts of the shagbark, however, are largely eaten by weevils, squirrels, and hogs, as well as by men, and are therefore much more likely to be destroyed than those of the less palatable pignut. Nevertheless, enough seed ordinarily escapes destruction to insure a fair reproduction, and sapling thickets of shagbark underneath the shade of older stands are rather common, especially in the Ohio Valley. These thickets are partly of seedling origin and partly sprouts from young trees which have been cut back for hoop poles or killed by fire.

Like pignut, shagbark is a very persistent sprouter in youth, and after land has been cleared for agricultural purposes no species in the central hardwood region is more difficult to kill out. In Ohio and Indiana, especially, it is common for shagbark and pignut sprouts to take possession of old fields and pastures after the oaks and other species have been all destroyed. With age the sprouting capacity of shagbark falls off rapidly, and is, therefore, less certain from trees of a merchantable size than from smaller ones. As with pignut also, the sprouts are slow growing and are outstripped in even-aged stands by oaks and other species. Shagbark seedlings are often crooked and unthrifty in appearance, but stump sprouts and seedling sprouts are apt to be straight and smooth.

#### MANAGEMENT.

In common with the other hickories, shagbark is adapted to management by either the simple coppice system or the selection system. For the production of small-sized material no method seems better adapted than that of clear cutting and reproduction by sprouts. Since the sprouting capacity falls off rapidly with age, in order to secure satisfactory reproduction the trees should be cut as soon as they are large enough to use. This method can be applied to hickory only in pure stands, such as are frequently found in old fields in Indiana and Ohio, or in plantations.

In mixture with faster-growing oaks, chestnut, and other species, or when large-sized material is desired, the hickories should be managed by the selection system, to which they are peculiarly adapted on account of their ability to endure shade and to make good growth after suppression. Natural reproduction is readily obtained through the opening of the stand by the removal of mature trees.

Since slow-growing material is relatively weak and brash, the object of management should be to make the trees free themselves of branches early, and then after a sufficient clear length has been obtained to induce rapid growth. This may be accomplished by repeated thinnings at intervals of about 10 years. Because of the value of its nuts and its suitability for fresh, fertile soils, shagbark should be favored in such situations in preference to the other hickories except that pignut, for its better wood, may be favored when there is no market for nuts. Pignut should also be favored on soils that are inclined to be dry and sandy, and big shellbarks on wet soils.

Approved :

JAMES WILSON,

*Secretary of Agriculture.*

WASHINGTON, D. C., *May 17, 1909.*